(1)

> $restart : interface(showassumed = 0) :$

> $assume\left(a^{*} \cdot a + b^{*} \cdot b = 1\right);$

> $U := \begin{bmatrix} a & b \\ -b^{*} & a^{*} \end{bmatrix};$

$$U := \begin{bmatrix} a & b \\ -\overline{b} & \overline{a} \end{bmatrix} \quad (2)$$

Is the "with linearAlgebra" statement below always and strictly necessary for a simple 2x2 inverse?
Its dizzying betwween Linalgebra-generic and non generic, Deep learning, and so many packages that have a matrix inverse function: How to choose?

> $with(LinearAlgebra) :$

The assume(a*a + b*b = 1) above seems to do nothing below.   how can we make the assumption stick?

> $D1 := Determinant(U);$

$$D1 := \bar{a}\, a + \bar{b}\, b \qquad (3)$$

Why does Inverse fail? is the modulus mandatory?

> $U^{\dagger} := Inverse(1, U);\ U^{\dagger} := Inverse(\ U);\ U^{\dagger} := inverse(\ U);$

$$U^{\dagger} := Inverse\left(1, \begin{bmatrix} a & b \\ -\bar{b} & \bar{a} \end{bmatrix}\right)$$

$$U^{\dagger} := Inverse\left(\begin{bmatrix} a & b \\ -\bar{b} & \bar{a} \end{bmatrix}\right)$$

$$U^{\dagger} := inverse\left(\begin{bmatrix} a & b \\ -\bar{b} & \bar{a} \end{bmatrix}\right) \qquad (4)$$

Is it possible to denote the usual inverse with the superscript -1?

> $U^{-1} := Inverse(U);$

Error, illegal use of an object as a name

$$U^{-1} := Inverse(U);$$

The assume(a*a + b*b = 1) above seems to do nothing below

> $Uinv := MatrixInverse([\,U\,]);$

$$Uinv := \begin{bmatrix} \frac{\bar{a}\, a + \bar{b}\, b}{a^2\, \bar{a}^2} & \frac{b}{\bar{a}^2\, a} \\ \frac{\bar{b}}{a^2\, \bar{a}} & \frac{1}{\bar{a}\, a} \end{bmatrix} \qquad (5)$$

The curly bracket seems to do what I expected Assuming would do (in-line format).
I'd also expect {} to mean a set!! Why is there no mention of {} in the Simplify documentation?

> $simplify\left(Uinv, \left\{a^{*} \cdot a + b^{*} \cdot b = 1\right\}\right);$

$$\begin{bmatrix} \frac{1}{\bar{a}^2\, a^2} & \frac{b}{\bar{a}^2\, a} \\ \frac{\bar{b}}{a^2\, \bar{a}} & \frac{1}{\bar{a}\, a} \end{bmatrix} \qquad (6)$$

The inverse should be much simpler (as below). Is Uinv really the inverse?

> $U . \begin{bmatrix} a^{*} & -b \\ b^{*} & a \end{bmatrix};$

$$\begin{bmatrix} \bar{a}\, a + \bar{b}\, b & 0 \\ 0 & \bar{a}\, a + \bar{b}\, b \end{bmatrix} \qquad (7)$$

Below I use r_t. Can one use r' (as in transformed r) and not mean it to be the derivative?

> $r_t := U.\begin{bmatrix} x + I\cdot y \\ z \end{bmatrix};$

$$r_t := \begin{bmatrix} a\,(x + \mathrm{I}\,y) + b\,z \\ -\bar{b}\,(x + \mathrm{I}\,y) + \bar{a}\,z \end{bmatrix} \tag{8}$$

> $assume(\alpha > 0):$

> $subs\left(a = \mathrm{e}^{\frac{I\cdot\alpha}{2}}, b = 0, r_t\right);$

$$\begin{bmatrix} \mathrm{e}^{\frac{\mathrm{I}}{2}\alpha}\,(x + \mathrm{I}\,y) \\ -\bar{0}\,(x + \mathrm{I}\,y) + \overline{\mathrm{e}^{\frac{\mathrm{I}}{2}\alpha}}\,z \end{bmatrix} \tag{9}$$

Why does it cc alpha despite the assume statement? and why zero-bar?

>

$$U^{\dagger} := Inverse\left(\left[\left[\begin{matrix} a & b \\ -\bar{b} & \bar{a} \end{matrix}\right]\right]\right) \tag{10}$$

>